

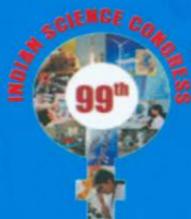


Keynote Address of

# SHRI VILASRAO DESHMUKH

Hon'ble Union Minister for  
Science & Technology and Earth Sciences  
Government of India

at the



## 99<sup>th</sup> Indian Science Congress

National Institute of Science Education  
and Research (NISER) and KIIT University,  
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*Dr. Manmohan Singh ji, Hon'ble Prime Minister of India; Shri Murlidhar Chandrakant Bhandare ji, His Excellency Governor of Odisha; Shri Naveen Patnaik ji, Hon'ble Chief Minister of Odisha; my colleague Dr Ashwani Kumar, Minister of State for Science & Technology, Earth Sciences and Planning; Prof. Geetha Bali, the General President of the 99th Indian Science Congress; Prof Ashok Kolaskar, Chancellor of KIIT; distinguished members of the scientific and academic community, delegates from abroad, media personnel, ladies and gentlemen!*

1. It is indeed a great occasion that the 99th Indian Science Congress is being held in Bhubaneswar - the capital city of Odisha which has a long history of over 2000 years starting with Chhedi dynasty. Bhubaneswar is in proud possession of magnificent sculptures and architectural heritage, coupled with the sanctity as Ekamrakshetra make this one of the great religious centres of Odisha since early medieval days.
2. Sir, our First Prime Minister Pandit Jawaharlal Nehru once said and I quote ***"It is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening of custom and tradition, of vast resources running to waste, or a rich country inhabited by starving poor... Who indeed could afford to ignore science today? At every turn we***

***have to seek its aid... The future belongs to science and those who make friends with science”.***

3. Sir, true to these words, Science and technology have contributed significantly to the evolution of human society. As Russian writer Leo Tolstoy once said, ***“True science investigates and brings to human perception such truths and such knowledge as the people of a given time and society consider most important”.*** The impact of science and technology has been growing as society becomes more and more advanced and matured with time. By drastically changing our means of communication, the way we work, our housing, clothes, and food, our methods of transportation, and, indeed, even the length and quality of life itself, science has generated changes in the moral values and basic philosophies of mankind. Science has changed the way we live and what we believe. By making life easier, science has given man the chance to pursue societal concerns such as ethics, aesthetics, education, and justice; to create cultures; and to improve human conditions.
4. Sir, when India achieved Independence, it inherited a shattered economy, hardly any worthwhile infrastructure for the development of science and technology, no sound industrial base, abysmally low

agricultural production and almost non- existence of health sector. Imported food grains fed the people. Famines were chronic. But defying all these hurdles India has surged ahead and has achieved dramatic success in the field of science and technology.

5. In the 1960s, India made head lines with its Green Revolution. High-yielding varieties and mechanization of agriculture led the country on the road to self-sufficiency, despite a rapid expansion in population. India emerged as the second largest paddy producer in the world and the world's largest sugar producer. With emphasis on horticulture, India also became the largest producer of fruits and the second largest of vegetables. The country ranks first in the production of mango and banana, and has the highest productivity of grapes in the world. A successful combination of technology and milk cooperatives followed by an immensely successful operation flood led to highly increased milk production positioning India as world's largest milk producer. The setting of National Dairy Development Board (NDDB) and National Milk Grid further promoted supply of quality milk throughout the country. In 1990s, propelled by scientific breakthroughs at some India's leading fishery research institutions, the country push ahead with a Blue Revolution. India holds the third position in the world fish production today.

6. In healthcare also tremendous scientific breakthroughs have been achieved. Infant mortality rate has gone down almost half of what it was sixty years ago; average life expectancy went up by more than 30 years. Smallpox, which killed or maimed millions every year, has been wiped out. Today India is in a position to manufacture, apart from conventional drugs, antibiotics like penicillin, streptomycin and tetracycline, as well as vitamins A, B and C at a cost about a fifth that of the imported drug. Indian pharma industry is ranked fourth in the world. The Indian R & D research is highly advanced in the development of vaccines especially for rota virus, influenza. India today is the key supplier of vaccines; one out of every three vaccines available in the global market has been manufactured and produced by Indian companies. In addition to the traditional vaccines a major impetus has been laid on development of new vaccines. Increased global collaborations are being leveraged to give a major push to the research in vaccines for major interactable disease such TB, Malaria, HIV. Other areas which have received special attention include: affordable Healthcare - Diagnostics, Infectious disease, Stem Cell Research and application of Nano Sciences to Healthcare.

7. The Telecommunication story has had a dream run in India. India operates second largest telecommunication network in the world in terms of number of wireless connections after China. There are over 850 million telephone connections, over 3 million Public Call Offices (PCOs), and nearly 800 million cellular subscribers in India. Similarly, the Internet using population in India has crossed the 100 million mark out of which about 12 million are broadband users.
  
8. India has established a state-of-the-art multi-gigabit pan-India network called 'National Knowledge Network' for providing a unified high speed network backbone for all knowledge related institutions in the country. The purpose of such a knowledge network goes to the very core of the country's quest for building quality institutions with requisite research facilities and creating a pool of highly trained professionals. The NKN is expected to enable scientists, researchers and students from different backgrounds and diverse geographies to work closely for advancing human development in critical and emerging areas.
  
9. Among the developing countries of the world, India has achieved the distinction of being the only one to have the complete infrastructure for a viable nuclear

programme. It has developed its own capacity of handling entire fuel cycle- right from uranium exploration, mining, extraction and fuel fabrication, besides facility of heavy water production, reprocessing of used fuel and waste management. India is now endeavouring to set up an ambitious nuclear energy programme with a target of producing 270 GW of nuclear energy by 2050.

10. One of the most visible success stories is the country's space programme. India's first satellite Aryabhata was a small satellite, weighing only 444 kg, which was primarily designed to test technology. But it far outlived its designing operating life of six years and went on to remain in the orbit and send data for almost 17 years. It was a remarkable feat for a first satellite designed and built by a country. India is today the only developing country to have the capacity of designing, building, and launching satellites indigenously. Today, India's space portfolio consists of array of satellites that aid in remote sensing, tele-education, tele-medicine, communication besides performing several other functions. Since 1982, the Indian Space Research Organization launched a series of geostationary satellites that include four satellites in the INSAT-1 series, three in the INSAT-2 series, the dedicated Kalpana-1 satellite, and the current INSAT-3A satellite. The next satellite, INSAT-3D, to be

launched soon, will have an advanced 6-channel imager and a 19-channel sounder. Recently launched Megha-Tropiques is the first satellite of the Indian space programme that is going to make systematic observations of parameters related to climate studies.

11. Sir, let me mention about a few major programmes of my ministries which helped connecting science to people and which made impact on society during past few years. My Ministry of Science & Technology had a few years back mounted a special program called "Innovation in Science Pursuit for Inspired Research" INSPIRE. The program was aimed at a transformational change in the ability of the science sector to attract talent for study of science and careers with research. INSPIRE bears five components covering the age groups of 10-32. The programme bears many components. More than 600,000 students have already received benefit of this scheme. We hope to double the reach and connect nearly 3 million youth to the scheme by 2017.
12. In order to provide to the Indian youth an opportunity to experience the joy of Science, the Department of Science & Technology launched a unique and innovative science exhibition mounted on a specially fabricated custom-built 16 coach train known as Science Express in 2007. The train has so far

completed 4 phases wherein it travelled a distance of 70000 km covering 24 states and one UT with 220 halts and 801 exhibition days covering 65 lakh visitors, including over 11 lakh students and more than 54,000 teachers from 11,000 schools in the country. About 2 lakh students conducted interesting experiments in the Joy-of-Science lab and participated in quizzes and other competitions conducted on platforms.

13. Sir, providing safe drinking water to the people is given high priority by our government. My ministries have taken up several initiatives to address this very important societal issue by employing advanced technological tools. Using an innovative technology known as Low Temperature Thermal Distillation which converts ocean saline water into safe drinking water, a plant with a capacity of 1 lakh liter per day was established by Ministry of Earth Sciences in Kaveritti islands which is working successfully for past five years. Two more LTTD plants, one at Minicoy and other at Agatti have been commissioned this year. A Technology Mission on "Winning, Augmentation and Renovation" for Water has been mounted by the Department of Science and Technology. Villages of around 10,000 level of population suffering from various water related challenges have been selected for pilot trials in a phased manner for finding out

various research solutions with technical feasibility, economic viability, social acceptability and sustainability. 17 different types of water challenges in 12 clusters in the country are being solved through convergent solutions and involving local bodies. CSIR has developed Thin Film Composite (TFC) reverse osmosis (RO) high flux membrane which helps to recover process water from domestic sewage through tertiary treatment. A one *million liters/day capacity plant* is successfully operating at Chennai for over four years. Arsenic/iron removal technology based on ceramic membrane for the production of safe drinking water from contaminated ground water which conforms to WHO standards has been transferred to industry.

14. Sir, India achieved significant progress in the field of weather and ocean related services in recent years. Today we have a world class Tsunami Warning System which provides forewarning of Tsunami within minutes of Tsunamigenic events in the Indian ocean region. We established a district-level Agro meteorological Advisory Services which provides regular farm advisories to farmers of the country. A SMS based agro-advisory service is also operational in the country through which farmers can get farm and weather related information in real time. There has been significant improvement in the accuracy of short

and medium range weather forecasting in the country. Thanks to the ambitious programme for modernization of India Meteorological Department launched by the government in 2008. Today IMD is equipped with most advanced weather detection tools like Geo-stationery and polar orbiting satellites, Doppler radars, automatic weather stations, etc. My Ministry of Earth Sciences has also established a special service for the fishermen of the country. This service provides advisories on Potential Fishing Zones in the coastal water based on advanced satellite based observations.

15. In this Decade of Innovation, I believe we need to look at alternate models of innovation to address the societal issues like health care. CSIR has mounted OSDD (Open Source Drug Discovery) which is a consortium with Global partnership aimed to provide affordable health care. A new anti-Tuberculosis drug based on CSIR technology has been launched under this programme. OSDD has emerged as a new platform for innovation through crowd sourcing. A number of new initiatives and programmes on affordable health care have been mounted by the Government of India. Ministry of Earth Sciences has strengthened research on drugs from Sea and polar region. The Department of Biotechnology has been making concerted efforts in the area of affordable

healthcare. Through an initiative of the department, it is now possible to diagnose dengue fever from day one using a new combi-kit developed through the efforts of scientists at the International Centre for Genetic Engineering & Biotechnology, New Delhi in partnership with a private company. The fundamental research at the International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi has led to the development of vaccine for malaria. The vaccine is designed to create antibodies that will protect individuals from malaria. Methods to produce the vaccine have been transferred to an Indian biotechnology company, Bharat Biotech International Ltd. (BBIL), Hyderabad.

16. In order to promote Grass root innovation system and expand R&D base, the National Innovation Foundation (NIF), Ahmedabad a grant-in-aid institution under Department of Science & Technology is making concerted efforts to help India become an inventive and creative society and a global leader in sustainable technologies without social and economic handicaps affecting evolution and diffusion of green grassroots innovations. The foundation has so far registered more than 160,000 grass root innovation practices of the country and developed a system for protecting the intellectual properties of the grass root innovation system. New

mechanisms for linking informal and formal innovation systems are being developed by NIF.

17. Sir, inclusive development can not take place without including the weaker sections of the society in the development process. My Science ministries are mounting several initiatives to address this important issue. The Department of Science & Technology has earmarked 5% of the budget for linking science to society on a sustainable basis.
  
18. Sir, our science and technology policy was enunciated in 2003. We need a new and well enunciated Science, Technology and Innovation policy. It should promote an innovation ecosystem that addresses the national priority for inclusive and sustained growth. My Ministry will dedicate to the Nation such a well balanced policy soon. To make sensible use of the bio-technological tools and techniques for the benefit of our people, we are establishing a transparent and evidence-based regulatory system.
  
19. Sir, our ministries are initiating several new programmes this year. The Ministry of Earth Sciences is launching a "Monsoon Mission" for improving the monsoon prediction to benefit sectors like agriculture, water, industry, etc. An Earthquake study through

deep-borehole investigation in Koyna-Warna area of Maharashtra is also being initiated. A new institution namely North East Centre for Technology Application and Reach (NECTAR) at Shillong is being established by the Department of Science & Technology in a year time. Research on Himalayan glaciology is being strengthened. CSIR is setting up a series of Innovation Complexes with world class facilities for undertaking translational research in partnership with Industry, R&D Institutions and Universities. The first three of them will be positioned at Chennai, Kolkata and Mumbai.

20. Sir, let me dwell upon a bit about the role our women can play in Innovation sector. Today we are moving into a future of global labour shortages, skills gaps and a world in which the educational and economic empowerment of women will become increasingly significant. In India women have played and are playing a crucial role in the challenges facing the nation! Today in all sectors of the economy, including the corporate sector, they have done rather well too occupying the highest positions of decision making and power. There is a strong connection between women's education and the potential for greater good through social entrepreneurship. Indian women are very active as social entrepreneurs, finding market-driven and often scalable solutions to many economic challenges. Moreover, women's economic activities

and businesses are often beneficiaries of these social ventures. In India quotas to support women's participation in decentralized governance have also recently been increased from 30% to 50%.

21. There is significant evidence that progress on poverty reduction and human development are related to advancements in both innovative capacities and gender equality. Both innovation and gender equality underpin all of the Millennium Development Goals (MDGs). Both innovation and women's empowerment require thinking "outside the box" and acting beyond existing, predefined parameters and traditional interventions. By cultivating innovation to empower women and foster greater gender equality, business, civil society, government academia and women themselves have the opportunity to create and harness new solutions that offer fresh perspectives to difficult problems. How can we harness innovation's power to empower women and promote greater gender equality? Possibly by:

- Identifying a well-defined pathway that connects innovation to empowerment;
- Using the pathway to assess powerful innovations that can change women's lives in technology use, social norm change and economic resilience; and

- Identifying the core levers that are essential for innovation to empower women and transform gender relations.
22. Sir, I must say that scientists and technologists of the country have been contributing immensely towards addressing the global challenges. With the changing S&T and innovation landscape of the country, I am quite confident that our scientists would be able to contribute with greater vigour to address such challenges in the time to come. While pursuing innovation, India is showing the path of practicing "Gandhian or so called Frugal Innovation". Such innovations have often brought solutions to very ticklish societal problems.
23. Sir, to conclude, I wish to say that given the unprecedented support that we have had from the Hon'ble Prime Minister and the confidence being accorded by the Planning Commission to Science, Technology and Innovation for the 12<sup>th</sup> Five Year Plan, we in the scientific community assure you that we shall continue to contribute our mite to position India in the comity of nations as a formidable player.

Thank You! Jai Hind.